

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : RICOH CO LTD

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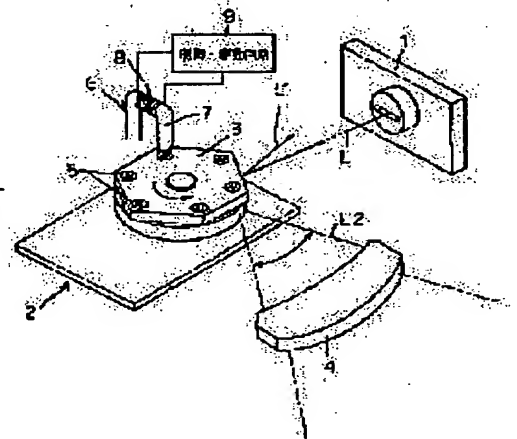
(72)Inventor : MIYAZAKI YOSHINORI

(54) OPTICAL SCANNING DEVICE AND IMAGE FORMING DEVICE USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a laser beam from leaking out of the optical scanning device by a simple mechanism.

SOLUTION: Plural permanent magnets 5 are arranged on a rotary polygon mirror 3 and an electromagnet 6 is arranged above them across a slight gap. The permanent magnets 5 and electromagnet 6 attract each other magnetically to attract each other wherever the rotary polygon mirror 3 stops, and the rotary polygon mirror 3 is positioned so that a laser beam L reflected by the rotary polygon mirror 3 leaks out of an optical housing by traveling in the opposite direction to its regular scanning direction.



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CLAIMS

[Claim(s)]

[Claim 1] The light source section which emits light in a laser beam, and the deflecting system which deflects the flux of light from this light source section, The optical element which carries out image formation of the flux of light by which was equipped with the rotating polygon and the deviation scan was carried out with this polariscope to a scan layer-ed, Are light-scanning equipment which consists of optical housing which contains them, and at least one permanent magnet is arranged on the top face of the above-mentioned rotating polygon. Leave few clearances in the upper part, arrange at least one electromagnet, and the polarity of the electromagnet produced by energizing in the polarity of the top face of the above-mentioned permanent magnet and the coil of the above-mentioned electromagnet is made into a different polarity. Light-scanning equipment which makes it the description as it pays well by the above-mentioned permanent magnet and mutual magnetism, and makes it stop by the position and comes to obtain the above-mentioned rotating polygon, when it energizes on the above-mentioned electromagnet.

[Claim 2] Light-scanning equipment of claim 1 characterized by to have carried out incidence of the physical relationship of the above-mentioned electromagnet and the above-mentioned permanent magnet from the above-mentioned light source section, and to consider as the arrangement which stops the above-mentioned rotating polygon in the location from which the flux of light reflected in respect of the above-mentioned rotating polygon is the location which cannot reach a scan layer-ed, and the flux of light of laser does not leak out of the above-mentioned optical housing.

[Claim 3] Image formation equipment which is image formation equipment of the electrophotography method which carried the scan optical equipment of a publication in above-mentioned claim 2 as a photographic filter, and makes it the description as it becomes impossible to carry out only in the condition of not energizing the energization to the coil of the above-mentioned electromagnet on the above-mentioned deflecting system and the motor for a photo conductor drive.

[Claim 4] Image formation equipment of claim 3 characterized by having the mode which can choose as arbitration whether it energizes to the coil of the above-mentioned electromagnet.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image formation equipment of the electrophotography method which uses light-scanning equipment and this as protection-from-light equipment.

[0002]

[Description of the Prior Art] Like the erector of the light-scanning equipment which consists of the light source section which emits light in a laser beam, the deflecting system which deflects the laser beam from the light source section, an optical element which carries out image formation of the beam by which was equipped with the rotating polygon and the deviation scan was carried out with the polariscope to a scan layer-ed, and optical housing which contains them, in case the quiescence optical properties on a scan layer-ed (a quiescence beam diameter, quiescence beam power, etc.) are measured, at least that of arbitration needs to fix laser beam light soon on a scan layer-ed. Usually, although the deflecting system (polygon motor) of light-scanning equipment did not have the function to position, it was not difficult to rotate the field of a rotating polygon in the deflecting system which uses a ball bearing as bearing, and to hold a laser beam by the position.

[0003] However, with high resolution-ization of the electrophotography equipment in recent years, high rotation-ization of deflecting system also progresses and the object of friction of the bearing dynamic pressure type [little] (oil, air, etc.) is put in practical use. In this type of bearing, it is very difficult to hold a rotating polygon by the position on the property that little friction is, in case the property of the quiescence beam on a scan layer-ed is measured for this reason, a beam cannot be held in a certain location, but the workability of the measurement like an erector and adjustment gets worse, and, also in time, loss is large.

[0004] On the other hand, in the image formation equipment of an electrophotography method, although laser does not usually emit light in the condition that the photo conductor has stopped, a serviceman etc. may make light emit compulsorily for maintenance and adjustment, and laser may become being in a lighting condition with as by failure of the control strip of laser. At this time, when the long duration exposure of the laser beam is carried out at a stopped photo conductor, a possibility that a laser beam may enter is also in the eyes of a serviceman or a user from the problem that local fatigue arises in a photo conductor, and the aperture for beam outgoing radiation of light-scanning equipment. Although there is also equipment with which the device which shades light is established in order to prevent these, the demand of a cost cut is increasing also with electrophotography equipment, and development of the cheap protection-from-light equipment of cost is desired by the easiest possible device.

[0005] In addition, if the conventional technique as this kind of protection-from-light equipment is mentioned, in JP,5-27718,U, the structure which intercepts laser at the time of disconnection of an optical unit is indicated, but since a laser beam is not intercepted when not removing an optical unit from a body, there are photo conductor fatigue when it means that the laser beam lit up with as by malfunction, and a problem that where of fear of contamination of an eye is when a serviceman carries out business, without removing an optical unit. Moreover, although it is the device which intercepts a laser beam in the technique of the indication to JP,5-79524,U according to closing motion of closing motion covering of a laser beam printer, since some housing is used as the elastic section, there is a problem of it becoming impossible to shade, when this is damaged by fatigue etc.

[0006] This invention is what was made in view of the above-mentioned conventional trouble, and aims at offering the light-scanning equipment which can prevent a laser beam leaking out of light-scanning equipment by the easy device, and the image formation equipment using this.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the light-scanning equipment applied to claim 1 among this inventions The light source section which emits light in a laser beam, and the deflecting system which deflects the flux of light from this light source section, The optical element which carries out image formation of the flux of light by which was equipped with the rotating polygon and the deviation scan was carried out with this polariscope to a scan layer-ed, Are light-scanning equipment which consists of optical housing which contains them, and at least one permanent magnet is arranged on the top face of the above-mentioned rotating polygon. Leave few clearances in the upper part, arrange at least one electromagnet, and the polarity of the electromagnet produced by energizing in the polarity of the top face of the above-mentioned permanent magnet and the coil of the above-mentioned electromagnet is made into a different polarity. When it energizes on the above-mentioned electromagnet, it is made into the description, as it pays well by the above-mentioned permanent magnet and mutual magnetism, and it is made to stop by the position and comes to obtain the above-mentioned rotating polygon. That is, a rotating polygon is positioned by the magnetism by which the permanent magnet arranged on the top face of a rotating polygon and the electromagnet in the upper part pay well, and the condition is held.

[0008] The light-scanning equipment of this claim 2 is characterized by to have carried out incidence of the physical relationship of the above-mentioned electromagnet and the above-mentioned permanent magnet from the above-mentioned light source section, and to consider as the arrangement which stops the above-mentioned rotating polygon in the location from which the flux of light reflected in respect of the above-mentioned rotating polygon is the location which cannot reach a scan layer-ed, and a laser beam bundle does not leak out of the above-mentioned optical housing.

[0009] The image formation equipment applied to claim 3 among this inventions is image formation equipment of the electrophotography method which carried the scan optical equipment of a publication in above-mentioned claim 2 as a photographic filter, and it makes it the description, as it becomes impossible to carry out only in the condition of not energizing the energization to the coil of the above-mentioned electromagnet on the above-mentioned deflecting system and the motor for a photo conductor drive. That is, only when image formation equipment is in a standby condition, even if positioned the rotating polygon to the position, it makes it a laser beam not reach a scan layer-ed and laser is incorrect-on, as protecting at the time of activities (cleaning inside equipment, check, jam processing, etc.) whose servicemen's and users' look in of image formation equipment, and local fatigue of the photo conductor in a standby condition are prevented, they are carried out.

[0010] The image formation equipment concerning this claim 4 cancels the function to position a rotating polygon when it judges that it is characterized by having the mode which can choose as arbitration whether it energizes to the coil of the above-mentioned electromagnet, namely, a user and a serviceman do not need to make a rotating polygon position in the state of anticipated use, and only when there is need, it enables it to operate a function.

[0011]

[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing below. The perspective view and drawing 2 which show the 1st operation gestalt of the light-scanning equipment which drawing 1 requires for this invention are the side elevation of this important section. The light-scanning equipment shown in drawing 1 consists of the laser unit 1 which emits light in a laser beam, the deflecting system 2 which deflects the laser beam L from the laser unit 1, an ftheta lens 4 which carries out image formation of the laser beam L in which the deviation scan was carried out by the rotating polygon 3 of deflecting system 2 to a scan layer-ed, and optical housing which contains these and which is not illustrated. two or more permanent magnets [top / rotating-polygon 3] 5 ... is arranged, and few crevices are vacated for the upper part, and the electromagnet 6 is arranged. As for the magnetic substance of an electromagnet 6, and 8, seven in drawing is [this coil and 9] the control drive circuits of the energization to a coil 8.

[0012] It is made for the scanning direction of normal to have not leaked [laser beam / L / which paid

well mutually even if it has made the inferior surface of tongue of N pole and an electromagnet 6 into the south pole for the top face of a permanent magnet 5 like illustration so that these permanent magnets 5 and an electromagnet 6 may pay well by magnetism, and the rotating polygon 3 stopped in which location, and was reflected by the rotating polygon 3] in a beam out of optical housing toward hard flow. That by which the beam L1 in drawing 1 goes to hard flow, and L2 are the usual scan light. In addition, although ***** [the number of permanent magnets 5 / one], since balance turns into that the very precise rotating polygon 3 is imbalanced, it is desirable to consider as the location which allotted even pieces to the vertical angle of a rotating polygon 3, and maintained balance.

[0013] Drawing 3 is the important section perspective view showing the 2nd operation gestalt of the light-scanning equipment concerning this invention. This operation gestalt is an example which positions two rotating polygons 3 at an angle of predetermined. Since it changes whenever the location of the permanent magnets 5a and 5b which allotted by using a different polarity on the rotation polyhedron 3 as a top face changes the sense of the current which flows in the coil 8 of an electromagnet 6, the incident angle of the laser beam L from the laser unit 1 to the reflector of a rotating polygon 3 changes, and it can carry out adjustable [of the reflective direction] if needed.

[0014] Drawing 4 is the important section perspective view showing the 3rd operation gestalt of the light-scanning equipment concerning this invention. This example makes only one piece the permanent magnet 5 on a rotating polygon 3, three electromagnets 6 are formed, and it enables it to have positioned the rotating polygon 3 in a different location of three places by energizing by turns, respectively. Of course, only the number of locations to position can arrange an electromagnet 5, and the include angle of a rotating polygon 3 can be changed.

[0015] Namely, what is necessary is to arrange only the number in the increase of an electromagnet, and a corresponding location, when a laser beam L wants to make into several places the location which carries out incidence on a scan layer-ed that what is necessary is just to arrange an electromagnet and a permanent magnet 6 corresponding to the location of a laser beam L, in order at least for predetermined one on a scan layer-ed to carry out incidence of the laser beam L soon.

[0016] The sectional view and drawing 6 which show the configuration of image formation equipment with common drawing 5 are the decomposition perspective view showing the configuration of the same common light-scanning equipment. the inside of drawing 5 , and 10 -- a photo conductor and 11 -- a development counter and 12 -- for an imprint machine and 15, as for a sheet paper cassette and 17, a fixing assembly and 16 are [an electrification machine and 13 / a photographic filter and 14 / a medium tray and 18] power units. As the light-scanning equipment 19 formed in the photographic filter 13 is shown in drawing 6 , the laser unit 1, deflecting system (polygon motor) 2, the rotating polygon 3, and the ftheta lens 4 grade are contained in the optical housing 20.

[0017] The example of a timing diagram of operation of the image formation equipment at the time of adding the configuration of above-mentioned light-scanning equipment is shown in this light-scanning equipment 19 at drawing 7 . In the condition that the polygon motor 2 is not energizing (drive), energize on an electromagnet 6 and it is made to function as protection-from-light equipment, and the energization to an electromagnet 6 is stopped at the time of image formation, and it cancels a protection-from-light function so that it may not become the hindrance of rotation of the rotating polygon 3 of the polygon motor 2. That is, energization to an electromagnet 6 is made off like illustration at the energization and coincidence to the polygon motor 2, and it is made not to bar rotation of a rotating polygon 3. The drive motor of a photo conductor 10 is rotated after that, and it enables it to start the warning of an image. When stopping the drive motor of a photo conductor 10, energization to the polygon motor 2 is made off at it and coincidence, and energization to an electromagnet 6 is set to ON, and a protection-from-light function is revived.

[0018] The example of a flow chart in the mode which chooses whether drawing 8 is energized to the coil of an electromagnet is shown, and drawing 9 shows the timing diagram of actuation by the flow of drawing 8 R> 8. namely, the thing for which an operator operates a protection-from-light function --

choosing (step 1) -- it judges whether the polariscope 2 is operating (step 2), and if it is not operating, after energizing to a polariscope 2, it energizes also to an electromagnet 6 immediately, a protection-from-light function is operated, the energization to a polariscope 2 is intercepted in an instant, and, also after that, a protection-from-light condition is maintained to a rotation halt of a rotating polygon 3 (step 3). Moreover, if the polariscope 2 is operating, a protection-from-light function will be operated at the same time actuation of image formation etc. is completed and the energization to a polariscope 2 is canceled (step 4). That is, while deflecting system 2 is driven for a moment since it is possible that the physical relationship of magnetism of an electromagnet 6 and a permanent magnet 5 is far from fully acting even if it energizes to an electromagnet 6, while deflecting system 2 suspends actuation of step 3 of drawing 8 and a protection-from-light function is not committed, either, and the rotating polygon 3 is rotating by inertia, it energizes on an electromagnet 6, and it enables it to make it function effectively.

[0019]

[Effect of the Invention] Since it is considering as the structure of positioning a rotating polygon by the magnetism by which the permanent magnet arranged on the top face of a rotating polygon and its upper electromagnet pay well in the light-scanning equipment of claim 1, it is effective in it becoming possible to make the reflector of a rotating polygon into the predetermined sense, and to make it stop by changing the location of an electromagnet.

[0020] Since the laser beam which carried out incidence from the light source section, and reflected the field of a rotating polygon in the light-scanning equipment of claim 2 arranges the permanent magnet and electromagnet of a rotating polygon so that the reflector of a rotating polygon may be held to the sense which cannot reach a scan layer-ed When deflecting system has stopped, even if laser emits light in addition to the equipment of above-mentioned claim 1, and common effectiveness, it is effective in it being possible to prevent a laser beam leaking out of optical housing by the easy device.

[0021] The function to carry the light-scanning equipment of claim 2 as a photographic filter, and to position a rotating polygon to predetermined in the image formation equipment of claim 3 Since it is made to operate only when image formation equipment is in a standby condition and he is trying for a laser beam not to reach a scan layer-ed when the deflecting system of light-scanning equipment and the motor for a photo conductor drive are not in an energization condition namely, both Even if laser is incorrect-on at this time, it is effective in the ability to protect at the time of an activity whose serviceman and user look into the interior of image formation equipment, and prevent local fatigue of a photo conductor.

[0022] Since discharge of the function to be in a standby condition, and to position a rotating polygon in the image formation equipment of claim 4 when it is not necessary to position a rotating polygon can be chosen, it is effective in it being possible to make consumed electric power small compared with the time of using the function to position a rotating polygon in addition to the equipment of above-mentioned claim 3 and common effectiveness.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the 1st operation gestalt of the light-scanning equipment concerning this invention.

[Drawing 2] It is the side elevation of this important section.

[Drawing 3] It is the important section perspective view showing the 2nd operation gestalt of the light-scanning equipment concerning this invention.

[Drawing 4] It is the important section perspective view showing the 3rd operation gestalt of the light-scanning equipment concerning this invention.

[Drawing 5] It is the sectional view showing the configuration of common image formation equipment.

[Drawing 6] It is the decomposition perspective view showing the configuration of common light-scanning equipment.

[Drawing 7] It is the timing diagram of the image formation equipment of drawing 6 at the time of adding the configuration of the light-scanning equipment concerning this invention of operation.

[Drawing 8] In actuation of the image formation equipment of drawing 6 at the time of adding the configuration of the light-scanning equipment concerning this invention, it is the flow chart in the mode which chooses whether it energizes to the coil of an electromagnet.

[Drawing 9] It is the timing diagram of actuation by the flow of drawing 8.

[Description of Notations]

- 1 Laser Unit
- 2 Deflecting System
- 3 Rotating Polygon
- 4 FTheta Lens
- 5, 5a, 5b Permanent magnet
- 6 Electromagnet
- 7 Magnetic Substance
- 8 Coil
- 9 Control Drive Circuit
- 10 Photo Conductor
- 11 Development Counter
- 12 Electrification Machine
- 13 Photographic Filter
- 14 Imprint Machine
- 15 Fixing Assembly
- 16 Sheet Paper Cassette
- 17 Medium Tray
- 18 Power Unit
- 19 Light-Scanning Equipment
- 20 Optical Housing
- L, L1, L2 Laser beam

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(71) 出願人 000006747

株式会社リコー

東京都大田区中馬込1丁目3番6号

(72) 発明者 宮崎 善範

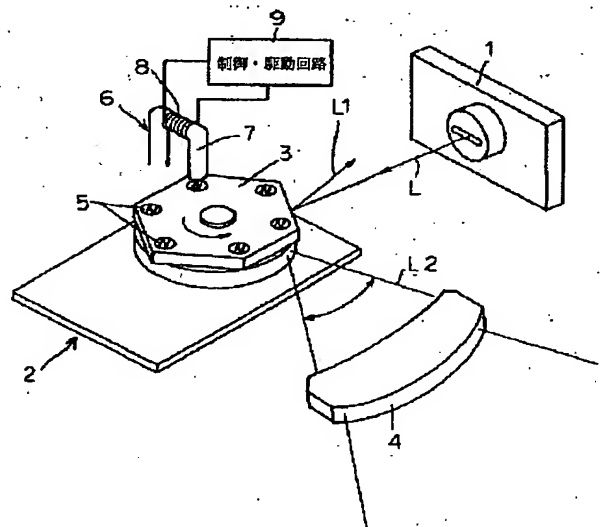
東京都大田区中馬込1丁目3番6号 株式会社リコー内

(54) 【発明の名称】 光走査装置及びこれを用いた画像形成装置

(57) 【要約】

【課題】 簡単な機構で光走査装置の外にレーザービームが漏れるのを防ぐことができる光走査装置を提供することを目的とする。

【解決手段】 回転多面鏡3上に複数の永久磁石5を配置し、その上方に僅かな透き間を空けて電磁石6を配置する。永久磁石5と電磁石6は磁力により引き合うようにし、回転多面鏡3がどの位置で停止しても互いに引き合い、回転多面鏡3で反射したレーザービームLが正規の走査方向とは逆方向へ向かい、光学ハウジングの外へビームが漏れないように回転多面鏡3の位置を保持する。



(2)

【特許請求の範囲】

【請求項1】 レーザビームを発光する光源部と、該光源部からの光束を偏向する偏向器と、回転多面鏡を備え該偏向器により偏向走査された光束を被走査面に結像する光学素子と、それらを収納する光学ハウジングとからなる光走査装置であって、上記回転多面鏡の上面に少なくとも1個の永久磁石を配し、その上方に僅かな隙間を空けて電磁石を少なくとも1個配し、上記永久磁石の上面の極性と上記電磁石のコイルに通電することで生じる電磁石の極性とを異なる極性とし、上記電磁石に通電した時に上記永久磁石と互いの磁力により引き合せて上記回転多面鏡を所定の位置で停止させ得るようにしてなることを特徴とする光走査装置。

【請求項2】 上記電磁石と上記永久磁石の位置関係を、上記光源部から入射し、上記回転多面鏡の面で反射した光束が被走査面に達し得ない位置で、かつ上記光学ハウジングの外にレーザの光束が漏れない位置で上記回転多面鏡を停止させる配置としたことを特徴とする請求項1の光走査装置。

【請求項3】 上記請求項2に記載の走査光学装置を露光器として搭載した電子写真方式の画像形成装置であって、上記電磁石のコイルへの通電を、上記偏向器及び感光体駆動用モータに通電していない状態でのみ行えるようにしてなることを特徴とする画像形成装置。

【請求項4】 上記電磁石のコイルへ通電するか否かを任意に選択できるモードを備えることを特徴とする請求項3の画像形成装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は光走査装置及びこれを遮光装置として用いる電子写真方式の画像形成装置に関する。

【0002】

【従来の技術及び発明が解決しようとする課題】レーザビームを発光する光源部と、光源部からのレーザビームを偏向する偏向器と、回転多面鏡を備え偏向器により偏向走査されたビームを被走査面に結像する光学素子と、それらを収納する光学ハウジングとからなる光走査装置の組立工程では、被走査面上の静止光学特性(静止ビーム径、静止ビームパワー等)を測定する際に、被走査面上でレーザビーム光を任意の位置に固定する必要がある。通常、光走査装置の偏向器(ポリゴンモータ)は位置決めをする機能を持っていないが、ボールベアリングを軸受とする偏向器では回転多面鏡の面を回転させ、レーザビームを所定の位置で保持することは難しくなかった。

【0003】しかしながら、近年における電子写真装置の高解像度化とともに、偏向器の高回転化も進み、その軸受も摩擦の少ない動圧(オイル、空気等)タイプの物が実用化されている。このタイプの軸受では、摩擦が少な

いという特性上、回転多面鏡を所定の位置で保持しておくことが極めて困難であり、このため被走査面上での静止ビームの特性を測定する際にビームをある位置で保持することができず、組立工程での測定及び調整の作業性が悪化し、また時間的にも損失が大きくなっている。

【0004】他方、電子写真方式の画像形成装置においては、感光体が停止している状態で通常レーザは発光しないが、保守、調整のためサービスマン等が強制的に発光させることがあり、またレーザの制御板の故障でレーザが点灯状態のままとなることもある。この時、停止している感光体にレーザビームが長時間照射されると感光体に局所的な疲労が生じるという問題や、光走査装置のビーム出射用窓からサービスマンやユーザの目にレーザビームが入る恐れもある。これらを防ぐために、光を遮光する機構が設けられている装置もあるが、電子写真装置でもコストダウンの要求が高まっており、できるだけ簡単な機構でコストの安い遮光装置の開発が望まれている。

【0005】なおこの種の遮光装置としての従来技術を挙げると、実開平5-27718号公報では光学ユニットの開放時にレーザを遮断する構造が開示されているが、光学ユニットを本体から外さない場合にはレーザ光が遮断されないため、誤動作によりレーザ光が点灯したままとなったときの感光体疲労や、光学ユニットを外さずにサービスマンが業務を遂行するときに目の被爆の恐れがあるという問題がある。また実開平5-79524号に開示の技術においては、レーザプリンタの開閉カバーの開閉に応じてレーザ光を遮断する機構となっているが、ハウジングの一部をその弾性部として用いているため、これを疲労等で破損したときに遮光することができなくなるという問題がある。

【0006】本発明は、上記従来の問題点を鑑みてなしたもので、簡単な機構で光走査装置の外にレーザビームが漏れるのを防ぐことができる光走査装置及びこれを用いた画像形成装置を提供することを目的とする。

【0007】

【課題を解決するための手段】本発明のうち請求項1に係る光走査装置は、上記目的を達成するために、レーザビームを発光する光源部と、該光源部からの光束を偏向する偏向器と、回転多面鏡を備え該偏向器により偏向走査された光束を被走査面に結像する光学素子と、それらを収納する光学ハウジングとからなる光走査装置であって、上記回転多面鏡の上面に少なくとも1個の永久磁石を配し、その上方に僅かな隙間を空けて電磁石を少なくとも1個配し、上記永久磁石の上面の極性と上記電磁石のコイルに通電することで生じる電磁石の極性とを異なる極性とし、上記電磁石に通電した時に上記永久磁石と互いの磁力により引き合せて上記回転多面鏡を所定の位置で停止させ得るようにしてなることを特徴とする。即ち、回転多面鏡の上面に配された永久磁石と、その上方

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にある電磁石が引き合う磁力により回転多面鏡を位置決めし、かつ、その状態を保持する。

【0008】同請求項2の光走査装置は、上記電磁石と上記永久磁石の位置関係を、上記光源部から入射し、上記回転多面鏡の面で反射した光束が被走査面に達し得ない位置で、かつ上記光学ハウジングの外にレーザー光束が漏れない位置で上記回転多面鏡を停止させる配置としたことを特徴とする。

【0009】本発明のうち請求項3に係る画像形成装置は、上記請求項2に記載の走査光学装置を露光器として搭載した電子写真方式の画像形成装置であって、上記電磁石のコイルへの通電を、上記偏向器及び感光体駆動用モータに通電していない状態でのみ行えるようにしてなることを特徴とする。即ち、画像形成装置が待機状態のときのみ回転多面鏡を所定の位置に位置決めし、被走査面にレーザービームが達しないようにし、レーザーが誤点灯していても、サービスマンやユーザが画像形成装置内部を覗くような(装置内部の清掃、点検、ジャム処理等)作業時に保護すること、また、待機状態における感光体の局部疲労を防ぐようにしてする。

【0010】同請求項4に係る画像形成装置は、上記電磁石のコイルへ通電するか否かを任意に選択できるモードを備えることを特徴とする、即ち、ユーザ及びサービスマンが通常の使用状態で回転多面鏡を位置決めさせる必要がないと判断したときに、回転多面鏡を位置決めする機能を解除し、必要のあるときのみ機能を作動させ得るようにしている。

【0011】

【発明の実施の形態】以下本発明の実施の形態を図面を参照して説明する。図1は本発明に係る光走査装置の第1の実施形態を示す斜視図、図2は同要部の側面図である。図1に示す光走査装置は、レーザービームを発光するレーザーユニット1と、レーザーユニット1からのレーザービームLを偏向する偏向器2と、偏向器2の回転多面鏡3により偏向走査されたレーザービームLを被走査面に結像するf θ レンズ4と、これらを収納する図示せぬ光学ハウジングとからなる。回転多面鏡3上には複数個の永久磁石5・・・が配置してあり、またその上方には僅かな透き間を空けて電磁石6が配してある。図中7は電磁石6の磁性体、8は同コイル、9はコイル8への通電の制御駆動回路である。

【0012】これら永久磁石5と電磁石6は磁力により引き合うように、例えば図示のように永久磁石5の上面をN極、電磁石6の下面をS極としてあり、回転多面鏡3がどの位置で停止しても互いに引き合い、回転多面鏡3で反射したレーザービームLが正規の走査方向とは逆方向へ向かい、光学ハウジングの外へビームが漏れないようにしてある。図1中のビームL1が逆方向へ向かうものの、L2が通常の走査光である。なお、永久磁石5は1個でもよいが、バランスが非常に精密な回転多面鏡3が

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アンバランスとなるため、偶数個を回転多面鏡3の対角に配してバランスのとれた位置とすることが望ましい。

【0013】図3は本発明に係る光走査装置の第2の実施形態を示す要部斜視図である。この実施形態は、回転多面鏡3を所定の角度で2ヶ所位置決めする例である。回転多面鏡3上に異なる極性を上面にして配した永久磁石5a、5bの位置が、電磁石6のコイル8に流れる電流の向きを切り替える度が変わるので、回転多面鏡3の反射面に対するレーザーユニット1からのレーザービームLの入射角が変化し、必要に応じて反射方向を可変できる。

【0014】図4は本発明に係る光走査装置の第3の実施形態を示す要部斜視図である。この例は、回転多面鏡3上の永久磁石5を1個のみとし、電磁石6を3個設け、それぞれ交互に通電することで回転多面鏡3を3ヶ所の異なる位置に位置決めできるようにしてある。もちろん、位置決めしたい位置の数だけ電磁石5を配置し、回転多面鏡3の角度を変えることができる。

【0015】即ち、被走査面上の所定の位置にレーザービームLを入射させるには、電磁石と永久磁石6をレーザービームLの位置に対応して配置すればよく、また被走査面上でレーザービームLが入射する位置を数カ所にしたいときは、その数だけ電磁石を増し、対応する位置に配置すればよい。

【0016】図5は一般的な画像形成装置の構成を示す断面図、図6は同じく一般的な光走査装置の構成を示す分解斜視図である。図5中、10は感光体、11は現像器、12は帯電器、13は露光器、14は転写器、15は定着器、16は給紙カセット、17は給紙トレイ、18は電源装置である。露光器13に設けた光走査装置19は、図6に示すように光学ハウジング20内にレーザーユニット1、偏向器(ポリゴンモータ)2、回転多面鏡3、f θ レンズ4等が収納してある。

【0017】この光走査装置19に、上述の光走査装置の構成を付加した場合の画像形成装置の動作タイムチャート例を図7に示す。ポリゴンモータ2が通電(駆動)されていない状態では、電磁石6に通電し、遮光装置として機能させ、画像形成時はポリゴンモータ2の回転多面鏡3の回転の妨げとならないように、電磁石6への通電を停止して遮光機能を解除する。即ち、図示のようにポリゴンモータ2への通電と同時に電磁石6への通電をオフとし、回転多面鏡3の回転を妨げないようにする。その後感光体10の駆動モータを回転させ、画像の警世を開始できるようにする。感光体10の駆動モータを停止させるときは、それと同時にポリゴンモータ2への通電をオフとし、かつ電磁石6への通電をオンとし、遮光機能を復活させる。

【0018】図8は、電磁石のコイルへ通電するか否かを選択するモードのフローチャート例を示し、図9は図8のフローによる動作のタイムチャートを示す。即ち、

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 操作者が遮光機能を作動させることを選択する（ステップ1）と、偏光器2が作動しているか否かを判断し（ステップ2）、作動していなければ、偏光器2への通電後、すぐに電磁石6へも通電して遮光機能を作動させ、瞬時に偏光器2への通電を遮断し、その後も遮光状態を回転多面鏡3の回転停止まで維持させる（ステップ3）。また、偏光器2が作動していれば、画像形成等の動作が終了して偏光器2への通電が解除されると同時に遮光機能を作動させる（ステップ4）。即ち図8のステップ3の動作は、偏向器2が停止し、かつ遮光機能も働いていないときに電磁石6へ通電しても、電磁石6と永久磁石5の位置関係が磁力が十分に作用するには遠いことが考えられるので、偏向器2を一瞬駆動し、回転多面鏡3が惰力で回転しているときに電磁石6に通電して効果的に機能させることができるようにする。

【0019】

【発明の効果】請求項1の光走査装置においては、回転多面鏡の上面に配した永久磁石と、その上方の電磁石が引き合う磁力により回転多面鏡を位置決めする構造としているので、電磁石の位置を変えることにより回転多面鏡の反射面を所定の向きにして停止させることが可能になるという効果がある。

【0020】請求項2の光走査装置においては、光源部から入射して回転多面鏡の面を反射したレーザビームが、被走査面に達し得ない向きに回転多面鏡の反射面を保持するように、回転多面鏡の永久磁石と電磁石とを配置しているので、上記請求項1の装置と共通の効果に加え、偏向器が停止しているときにレーザが発光しても、簡単な機構で光学ハウジングの外へレーザビームが漏れるのを防ぐことが可能であるという効果がある。

【0021】請求項3の画像形成装置においては、請求項2の光走査装置を露光器として搭載し、回転多面鏡を所定に位置決めする機能は、光走査装置の偏向器と感光体駆動用モータが両方ともに通電状態でないとき、すなわち画像形成装置が待機状態の時のみ作動させ、被走査面にレーザビームが達しないようにしているので、この時レーザが誤点灯していても、サービスマンやユーザが画像形成装置内部を覗き込むような作業時に保護したり、また感光体の局所的な疲労を防止することができるという効果がある。

【0022】請求項4の画像形成装置においては、待機状態で、回転多面鏡を位置決めする必要がないときに回転多面鏡を位置決めする機能の解除を選択できるので、上記請求項3の装置と共通の効果に加え、回転多面鏡を

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 位置決めする機能を働かせたときと比べ消費電力量を小さくすることが可能であるという効果がある。

【図面の簡単な説明】

【図1】本発明に係る光走査装置の第1の実施形態を示す斜視図である。

【図2】同要部の側面図である。

【図3】本発明に係る光走査装置の第2の実施形態を示す要部斜視図である。

【図4】本発明に係る光走査装置の第3の実施形態を示す要部斜視図である。

【図5】一般的な画像形成装置の構成を示す断面図である。

【図6】一般的な光走査装置の構成を示す分解斜視図である。

【図7】本発明に係る光走査装置の構成を付加した場合の図6の画像形成装置の動作タイムチャートである。

【図8】本発明に係る光走査装置の構成を付加した場合の図6の画像形成装置の動作において、電磁石のコイルへ通電するか否かを選択するモードのフローチャートである。

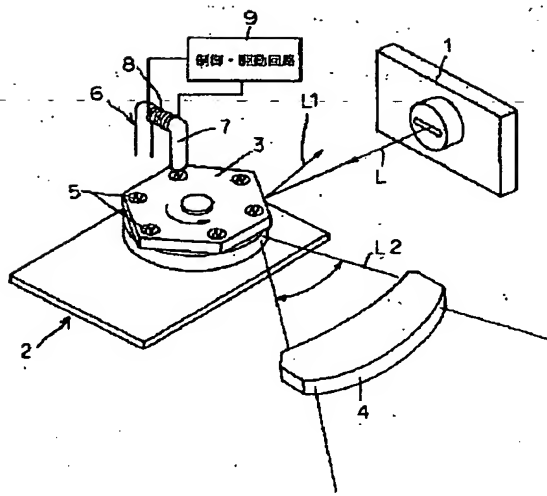
【図9】図8のフローによる動作のタイムチャートである。

【符号の説明】

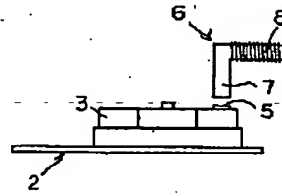
- 1 レーザユニット
- 2 偏向器
- 3 回転多面鏡
- 4 f.θレンズ
- 5、5a、5b 永久磁石
- 6 電磁石
- 7 磁性体
- 8 コイル
- 9 制御駆動回路
- 10 感光体
- 11 現像器
- 12 帯電器
- 13 露光器
- 14 転写器
- 15 定着器
- 16 給紙カセット
- 17 給紙トレイ
- 18 電源装置
- 19 光走査装置
- 20 光学ハウジング
- L、L1、L2 レーザビーム

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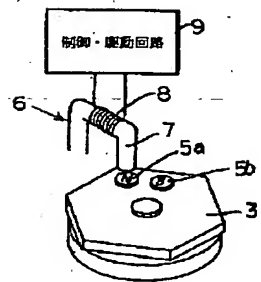
【図1】



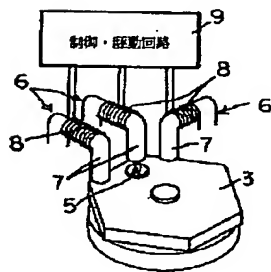
【図2】



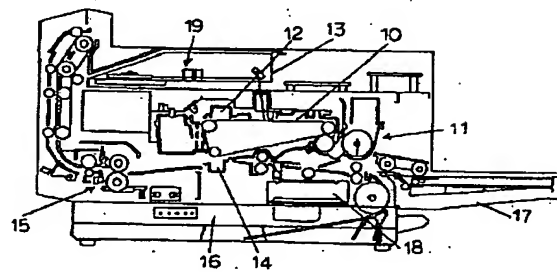
【図3】



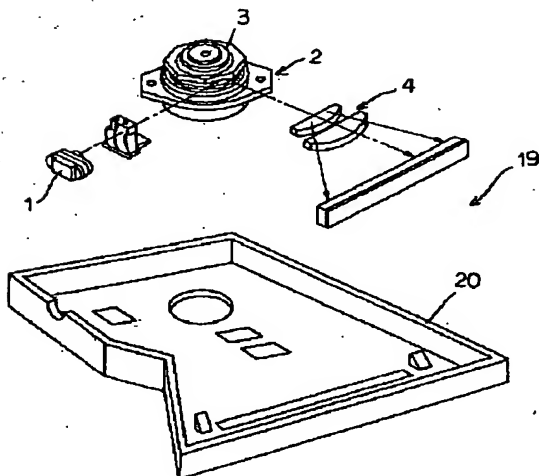
【図4】



【図5】

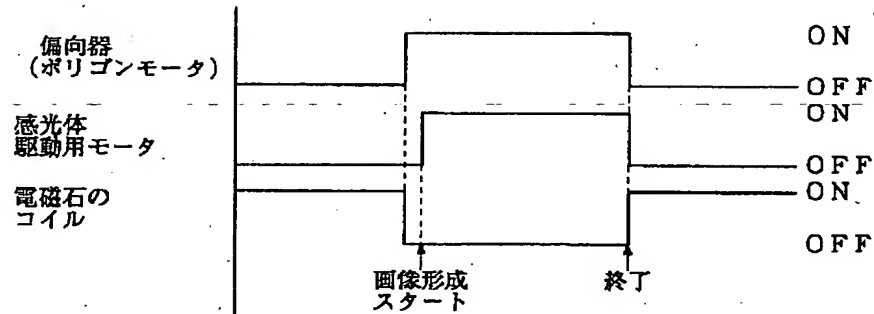


【図6】

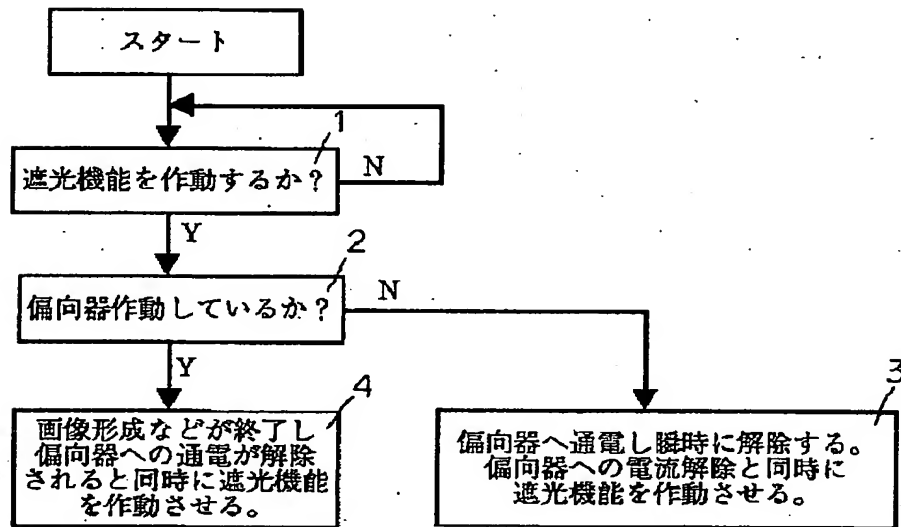


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【図7】



【図8】



【図9】

